

Drive equipment

8-FOOT TRANSONIC TUNNEL MAIN DRIVE LUBRICATION SYSTEM

A. General remarks:

A new lubrication system has been installed on the main drive fan of the 8-foot transonic tunnel. Basically the system operates as follows: a six gallon per minute oil pump pumps oil under pressure from a main oil tank to the two roller bearings on the main drive shaft. Prior to reaching the bearings, the oil has been filtered and the temperature regulated by an oil cooler. Flowrators indicate the flow to each of the bearings. The oil flows from the bearings to two accumulator tanks (one for each bearing) by gravity. A dual unit vacuum pump maintains a vacuum in these accumulator tanks thus making it impossible for the reduced pressure in the nacelle, when the tunnel is operating, to suck oil out of the main bearings and into the tunnel. Each accumulator tank is equipped with a float switch which operates a three gallon per minute pump that returns the oil to the main oil tank.

B. Safety devices:

To insure the safe operation of the new lube system, the following safety devices have been installed: (1) Flowrators are installed in the supply line to each bearing and will trip the tunnel off the line should the oil flow become insufficient for proper lubrication. (2) Mercoid switches will indicate low oil pressure by giving an annunciator light in the mezzanine and on the control panel. (3) Mercoid switches will indicate insufficient vacuum in the accumulator tanks by extinguishing the red lube house light on the control panel. (4) A white light on the control panel will indicate that the power to one or more of the pumps in the lube house was not turned on.

Ward, D. H.

C. Operation:

The main fan lube equipment is turned on by a single on-off switch on the electrical box just outside the lube house door. If all of the equipment is operating properly the red lube house light on the control panel will be on with the white light and the annunciation light off. If the equipment runs and the red light fails to come on, the accumulator tanks have insufficient vacuum. A white light indicates that the power to one or more of the pumps was not turned on. An annunciation light indicates either low oil pressure or low oil flow; however, the annunciation light is connected to the electrical drive system and may indicate electrical trouble. Every time the lube house is started the lubricators on the duo-vacuum pump unit should be checked to make sure they are full of oil, and the oil filter should be bled to expel any air which may be in it.

D. Normal operating conditions:

1. Main oil pressure - 50 psi. Satisfactory limits will be from 45 to 55 psi.

2. Oil flow to bearings - Upstream bearing should get approximately 2.2 gal/min when cold and 1.7 gal/min with the tunnel hot. Downstream bearing should get approximately 1.5 gal/min when cold and 1.0 gal/min with the tunnel hot.

3. Vacuum in accumulator tanks - 10 inches mercury vacuum. Satisfactory limits will be from 5 to 15 inches mercury vacuum.

4. Oil cooler temperature - 110° F. A satisfactory upper limit will be 115° F.

5. Oil heater temperature - 110° F. To prevent cold oil from entering the bearings and resulting in poor lubrication, the oil is preheated to 110° F.